



# CASCABEL CONSERVATION ASSOCIATION

SUPPORTING CONSERVATION, COMMUNITY AND CONTEMPLATION  
IN THE MIDDLE SAN PEDRO RIVER VALLEY

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May 22, 2015

Benson Mayor and City Council  
P.O. Box 2223  
Benson, AZ 85602

Dear Mayor King and the Benson City Council:

I spoke to you at the public hearing on the Vigneto Development on April 13<sup>th</sup> and would like to follow up with some thoughts. I am co-president of the Cascabel Conservation Association and a member of the Cascabel community. We are very concerned about such large water withdrawals upstream from our area. In my presentation I emphasized the four “M’s” of water development (Model proposed actions, Monitor the results, Minimize water use, and Maximize groundwater recharge) and specifically expressed the need to more fully model the groundwater withdrawal associated with the development. Here I want to reiterate the need for this advanced modeling and explain the reasons why. If you approve the Final Master Plan when it comes before you, it is imperative to complete the essential groundwater modeling to understand the sustainability of drawing upon the regional aquifer following the build-out of this development. We strongly urge the City Council to pledge its support for this modeling effort and to work with the various interests, agencies and developer to complete it.

## Overview

The water that would be withdrawn for El Dorado’s Vigneto Development would come from a deeper aquifer closer to the basin’s center that recharges very slowly from distance sources. This would result in a continual decline in the water in that aquifer with very little replacement by new water. While the Arizona Department of Water Resources has assured Benson that it has a 100-year Adequate Water Supply for this development, knowing how fast this supply will decline and the area over which this will occur is vital.

The planned pumping will significantly increase the rate of depletion of the deeper aquifer beneath Benson and potentially other locations along the San Pedro River as well, with negative impacts to both municipal and agricultural wells. The modeling studies that have been done to date of the rate and magnitude of this decline have produced highly variable results based upon an oversimplified model (THWells) that does not address the geological and hydrological complexities of the Benson area. Thus a more thorough and comprehensive modeling study is warranted.

Withdrawals from the deeper aquifer would more than double the current withdrawal of ~5,800 acre-feet/year in the Benson area and could exceed this amount by more than 10,000 acre-feet of water per year<sup>1</sup> depending upon assumptions of Vigneto water use. This use could result in groundwater declines of 200 feet or more in 100 years in the area where water is being withdrawn. Any recharge of this deeper aquifer would be extremely slow and would restore only a very small portion of this withdrawal.

The recharge that El Dorado says it will attempt would affect only the most-shallow aquifers and would likely have little effect on the aquifer from which the water is withdrawn. While this shallow recharge is very important, it would not replenish Benson's future water supply, as the negative effect on Benson water is from the pumping of the deeper aquifer. That supply would diminish as long as pumping exceeds groundwater inflow to the aquifer through recharge and capture. As that supply diminishes, the cone of depression associated with the drawdown will propagate laterally over a larger area, and subsidence may occur.

### **Geological Considerations**

The aquifer from which Benson withdraws water is "confined," meaning that it does not have a direct vertical connection to the atmosphere. This is the basis of El Dorado's argument that the water withdrawal would not affect the San Pedro River. The thick clay layers between the shallow floodplain aquifer and this deeper aquifer likely inhibit direct, vertical water flow. This situation, however, raises the question of how water *can* enter that deeper aquifer.

Water in this aquifer is probably replaced primarily through lateral connection to mountain-block faults and fractures and mountain-front washes or streams. Thus the mostly likely source of recharge is the mountains around the margins of the basin, both through the bedrock of the Whetstone or Dagoon Mountains and most importantly in the washes close to them. Because Benson would supply Vigneto's water by withdrawing water from beneath the confining layer, Vigneto's largest potential effect on the San Pedro River could occur far upstream or downstream from the development.

The determination of the likely timing and locations of water depletion in the region around Benson is the reason that updated modeling is needed using more recent analyses of the Benson area's geology and hydrology. As noted above, water must infiltrate and be allowed to recharge around the margins of the basin in order to refill the deeper aquifer being depleted toward the basin center. Pumping from the deep aquifer faster than the recharge rate would pull groundwater inward from these margins and distant sources. This withdrawal would likely significantly and perpetually lower groundwater levels in those areas and may eventually impact distant surface waters and river flow as well. Knowing the location and rate of this decline is important to predicting reductions in future water supplies and likely areas of vulnerability.

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<sup>1</sup> Note that the Arizona Department of Water Resources approved an Adequate Water Supply of 12,000-acre-feet/year for Whetstone Ranch, which was to contain a maximum of 24,000 housing units. Whetstone Ranch had requested more than 15,000 acre-feet/year for the development. In contrast, El Dorado is proposing 28,000 housing units for Vigneto. While the figure of 10,000 acre-feet/year is more than El Dorado claims, it is still conservative given Whetstone's water allotment for 4,000 fewer homes.

The time required for water to travel the many miles laterally in the subsurface to naturally recharge the aquifer can be hundreds or thousands of years, much longer than the time-frame used to qualify for a certificate of an adequate 100-year water supply. One can determine the rate and magnitude of changes in capture and recharge only by making reasonable assumptions of anticipated rainfall and modeling underground flow rates. To proceed with such a large use of a limited water resource without a refined and broader analysis could jeopardize the future long-term availability of water to various users and communities along the San Pedro Valley, including Benson itself.

## **Modeling**

Councilman Cook has noted the great number of studies that have been done on the San Pedro River and feels that future studies will tell us nothing more of significance. This does not acknowledge what is unknown for the middle San Pedro portion of the river, however. As you may know, the U.S. Geological Survey has been pursuing a three-part study of the hydrology of the middle San Pedro Valley, which includes Benson. The final modeling phase of this project was suspended due to state funding cuts. This phase would address water movement through the Middle San Pedro basin and needs to be completed to more fully determine the impacts of future groundwater withdrawals. Neither the Arizona Department of Water Resources nor the U.S. Geological Survey feels that past modeling realistically addresses the geological and hydrological complexities of the Benson area.

Most importantly, updated modeling would more fully determine how the Vigneto development would reduce future water supplies. The model must be built around the number, depth, and location of wells that would be pumped for this development given the area's unique geology and run under a variety of conditions to various points in the future to determine a range of outcomes. This is needed to better predict how water availability would decline through time, when critical points in that drawdown may be reached, and how various other users may be affected. Even without modeling, supplying a city of Vigneto's proposed size *indefinitely* though time with groundwater from solely the aquifer being accessed is not sustainable. Cordova et al. (2015)<sup>2</sup> note that the annual removal of water from storage in the Benson subarea already exceeds recharge by ~6,200 acre-feet/year, and Vigneto could more than double that loss.

The future and possible negative outcomes on the users and communities along the San Pedro of such a large, new water use need to be carefully considered, and pursuing this modeling through some avenue is critical. Bringing together a group of different interests and funding sources may be necessary to complete it given its cost. Having the developer contribute would seem appropriate. The Benson City Council could play an important role in helping achieve this collaborative effort by actively supporting the modeling.

The most logical entities to undertake the study would be the U.S. Geological Survey in conjunction with the Arizona Department of Water Resources and the Department of Hydrology

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<sup>2</sup> Cordova, J.T., Dickinson, J.E., Beisner, K.R., Hopkins, C.B., Kennedy, J.R., Pool, D.R., Glenn, E.P., Nagler, P.L., and Thomas, B.E., 2015, Hydrology of the middle San Pedro Watershed, southeastern Arizona: *U.S. Geological Survey Scientific Investigations Report 2013–5040*, 77 p., <http://dx.doi.org/10.3133/sir20135040>.

and Water Resources at the University of Arizona. They have long worked together on water issues in the upper and middle San Pedro Valley. In addition, The Nature Conservancy has a large, vested interest in the valley both upstream and downstream from Benson. They may be able to help establish the coalition and funding needed to undertake the modeling. Perhaps the Walton Family Foundation could contribute some funding through its Freshwater Initiative, which has a focus on the San Pedro Valley through the Cochise Community Foundation and Cochise Water Project.

## Conclusions

Groundwater pumping to supply Vigneto would at least double the total annual rate of decline of water storage in the Benson area. This would continually diminish water availability in the middle San Pedro basin from one of the area's primary aquifers. Determining the rate and extent of that decline is important to predicting future water availability. Proceeding without broader, updated modeling could set Benson on a path of even greater long-term unsustainable use for both people and the environment.

In light of these concerns, we urge the City Council to support more complete groundwater modeling to better predict groundwater changes and guide the city and developer in modifying Vigneto through time if necessary. We ask the city to reach out to the U.S. Geological Survey, the Arizona Department of Water Resources, the University of Arizona, and others to complete this study. While El Dorado can argue about what they believe will happen, they cannot predict what will occur. Although refined modeling cannot predict exactly what will happen (the unknowns are still too great), using current geological and hydrological knowledge in this modeling would help the city design more responsibly for growth and avoid short-changing current residents, future residents, and the future of the San Pedro River.

Sincerely,



Norm "Mick" Meader  
Co-President, Cascabel Conservation Association

Ex. 6 - Personal Privacy

cc: Thomas Buschatzke, Director, Arizona Department of Water Resources  
James Leenhouts, Director, Arizona Water Science Center, U.S. Geological Survey  
Thomas Maddock, Department of Hydrology and Water Resources, University of Arizona  
Patrick Graham, Director, The Nature Conservancy of Arizona  
Cochise County Board of Supervisors